IWR-GeoFIT

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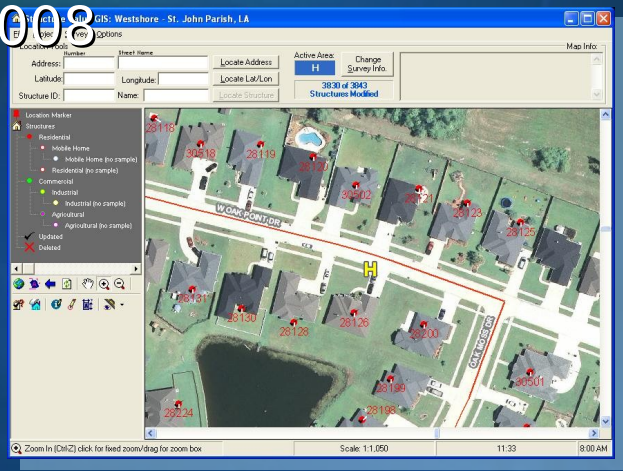
Geospatial Floodplain Inventory Tool

Presented by:

Brian Maestri -- Regional Economist, New Orleans District
Judith Walker -- Economist, URS Corporation
Greg Gagliano -- GIS Project Manager / Developer, HDR Engineering

May 2008



Overview

Brian Maestri

- Introduction
- Initial development of the GIS Application by New Orleans District
- Further development and adaptation of the tool by IWR
- Technical overview – how the tool is used
- Experiences from the field

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MVN Structure Inventory

- Pre -2004 METHOD
  - Paper Maps only
  - Manual Location of structures
  - Marshall & Swift paper forms for data collection
  - Field Data manually entered into M&S Estimators and valued one structure at a time
  - Values are manually retyped into HEC-FDA format for flood damage assessment

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MVN Structure Inventory

- After Automation:
  - Laptop with mapping capabilities is taken into field
  - Finding structure locations automated
  - Simplified electronic form used to enter structure details
  - GIS is used for analyzing field data back in office
  - Data automatically exported to value assessment program
  - Values calculated in batch process
  - Values exported in HEC-FDA compliant format

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MVN Structure Inventory

- MVN studies that have used a version of GeoFIT:
  - Alexandria to the Gulf of Mexico (pilot)
  - Larose To Golden Meadow
  - St. Charles Parish Urban Flood Control
  - New Orleans To Venice, LA
  - Westshore St.John Parish
  - Bayou Manchac
  - SELA Slidell W-14 (on going)
  - Calcasieu Parish (on going)

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Why Automate?

Estimated savings of roughly

2.3 Minutes per inventoried structure

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Technical Workflow

Greg Gagliano

Transition to IWR-GeoFIT / Corps-Wide Product

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IWR-GeoFIT

MVN Structure Inventory to IWR-GeoFIT

- IWR began looking at providing MVN's GIS Inventory automation tool as standard for HEC-FDA inventory collection & valuation

- How can we make this work for all Corps Districts?

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Evaluating the MVN tool

Needs Assessment

- Conducted Live Meeting Web Demo on 6/26/07
- Conducted Follow up Phone Interviews with attendees and others from Corps districts and IWR

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Evaluating the MVN tool

Needs Assessment

- Main concerns or issues mentioned during live meeting:
  - Working with other map coordinate systems
  - Using tax assessor data for values or not using Marshall & Swift Estimators
  - Lack of GIS/Database expertise or availability to support a SIMGIS type application economics at all districts
  - Field collection forms designed for MVN may not collect all data required by other districts (*i.e. basements*)
  - Method for assigning hydrologic stations

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Evaluating the MVN tool
Needs Assessment

- Decision:
  - Quickest deployment possible while addressing minimum necessary changes for Corps-wide use

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Evaluating the MVN tool

Refinement Scope

- Make ArcGIS Engine Compatible
- Make compatible with all map coordinate systems
- Testing & Debugging
- Form Updates (added more details)
- Documentation

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MVN SV-GIS Refinement Status

- Renamed IWR-GeoFIT
- Deployment : Summer ‘07

IWR-GeoFIT

What is GeoFIT?

- Not a Model
- Little (if any) Internal Analysis
- No Integrated Structure Valuation
- Automation and Data Management

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IWR-GeoFIT

What is GeoFIT?

- Stand Alone Application
- Powered by ESRI ArcGIS Engine
- Mobile GIS

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Structure Inventory Workflow

1. Project–specific spatial data setup
2. On-site “Windshield” Data Collection
3. GIS Post-Processing
4. Valuation
5. HEC-FDA Export

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Download and Installation

- Website:
  http://www.iwr.usace.army.mil/inside/products/proj/softGeoFIT.cfm
- Downloads
  - Design Document
  - Program Installer with Help
  - Sample Project
  - File Templates
  - Admin Guide
- Versions available for 9.1 and 9.2

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Working with Projects

- GeoFIT is designed to work with multiple projects
- One project at a time
- Each project has its own data, associated map and support files

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The Project Geodatabase

- The Heart of GeoFIT inventory and valuation process
- Where the structure data “lives”
- System independent
  - Spatial Information
  - Marshall and Swift Information
  - FDA Information
  - Other
- Open-ended
  - Free to add relationships & attributes
  - Manual population or automated population enables flexibility

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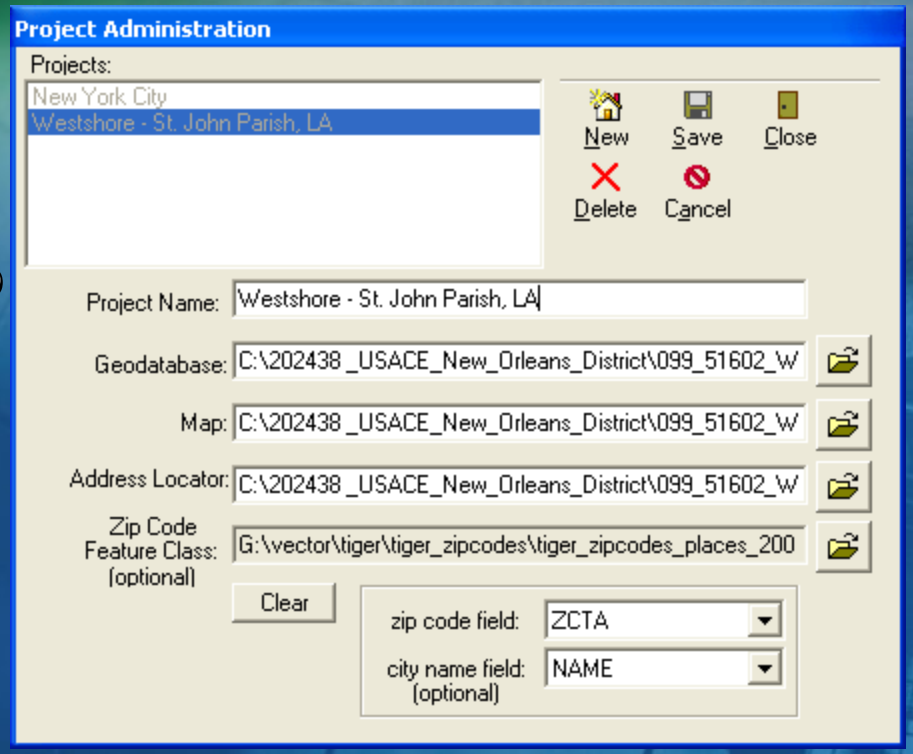
Configuring GeoFIT

- GeoFIT Project Administrator
  - Geodatabase, Map Document, Address Locator are assigned to project name
  - Optional Zip Code layer is used to assign city and zip code for structures created in the field.



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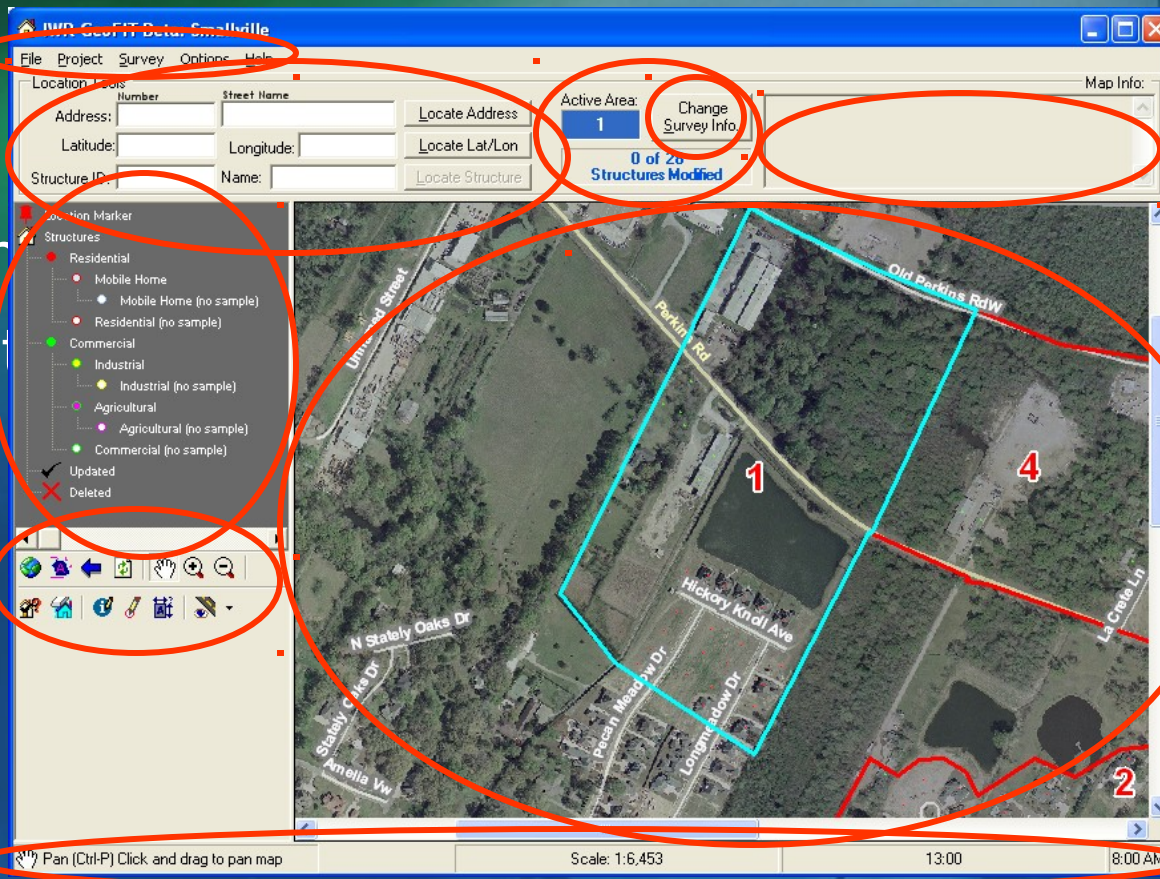
IWR-GeoFIT

Main Form

- Components
  - Main Menu Bar
  - Location Tools
  - Information Wir
  - Survey Informat
  - Change Survey
  - Map
  - Legend
  - Toolbox
  - Status Bar



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Data Attribute Editing

- Identify Structure Tool enables structures to be identified by map location and appropriate data entry form to appear
- Create New Structure Tool enables structures to be created at map location
- 2 data entry forms
  - Residential
  - Commercial

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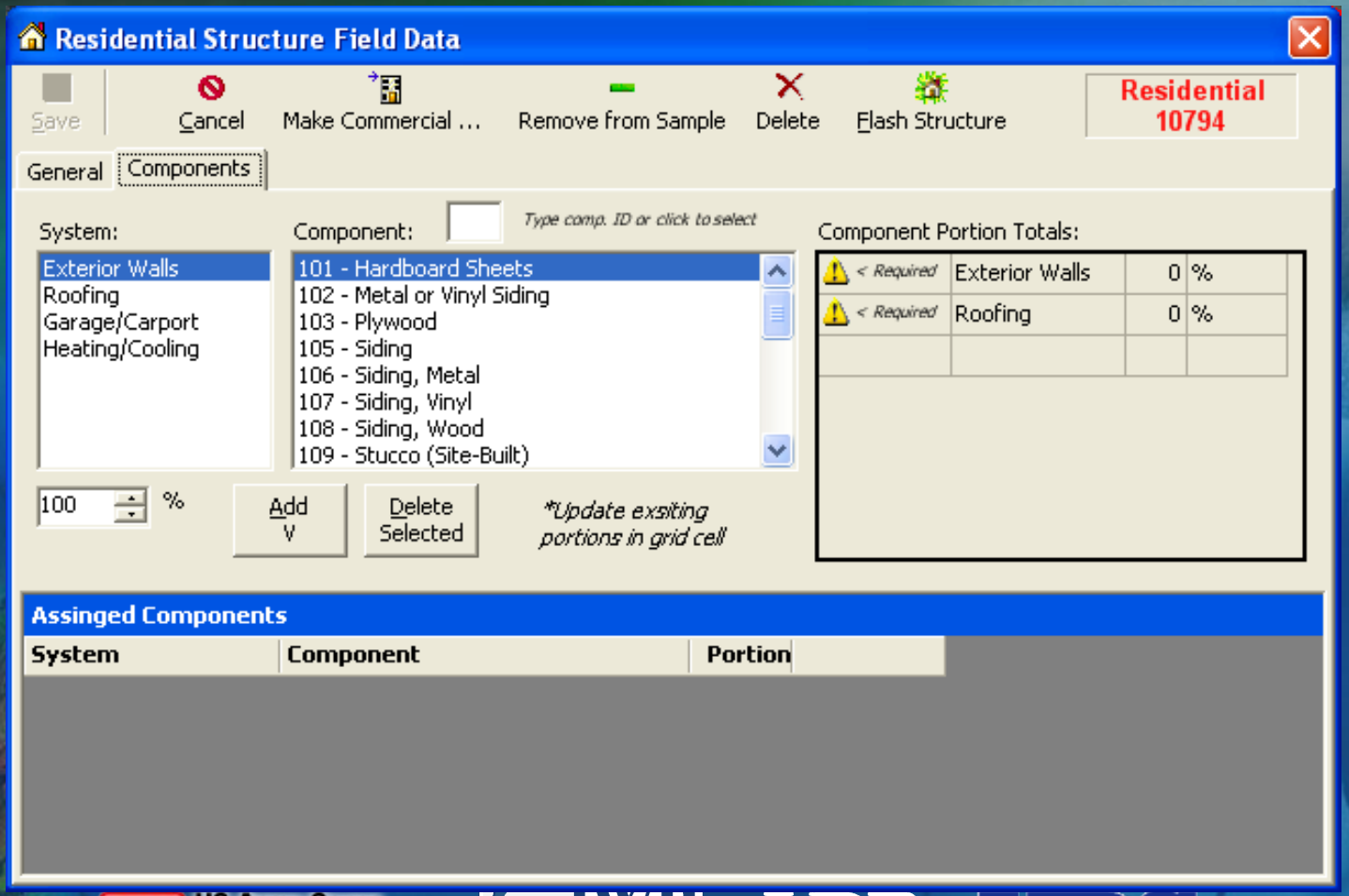
Residential Form



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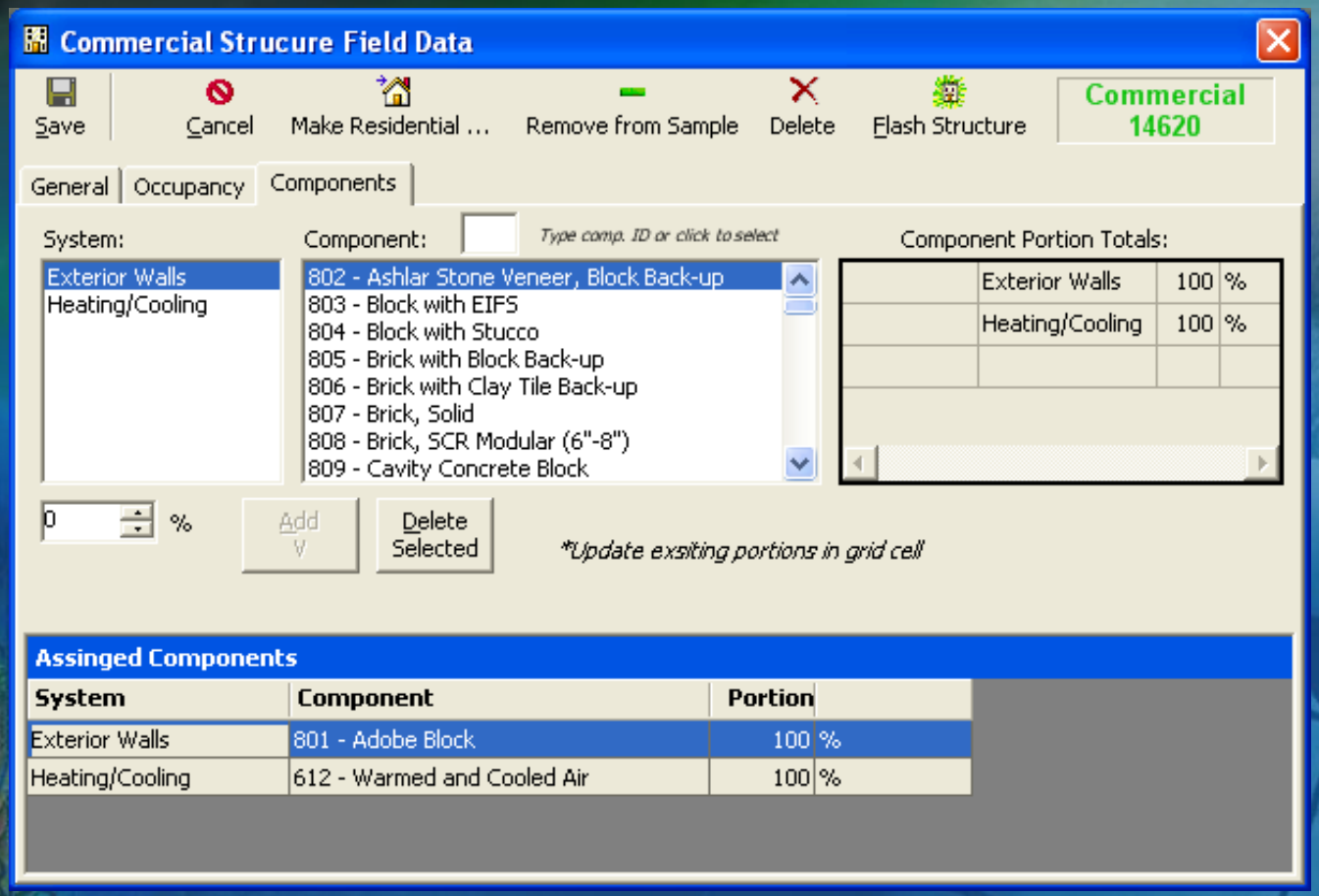
Commercial Form



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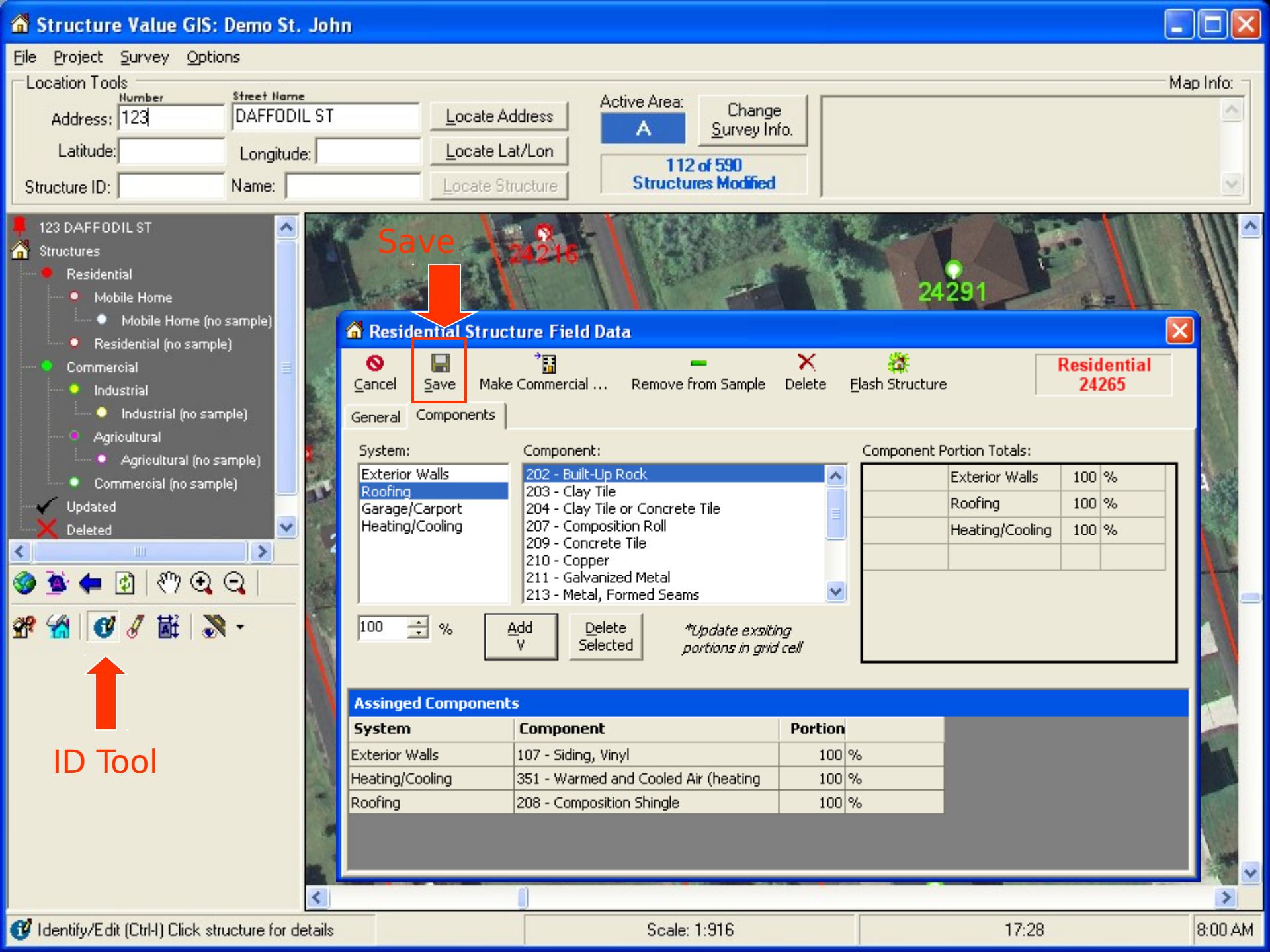
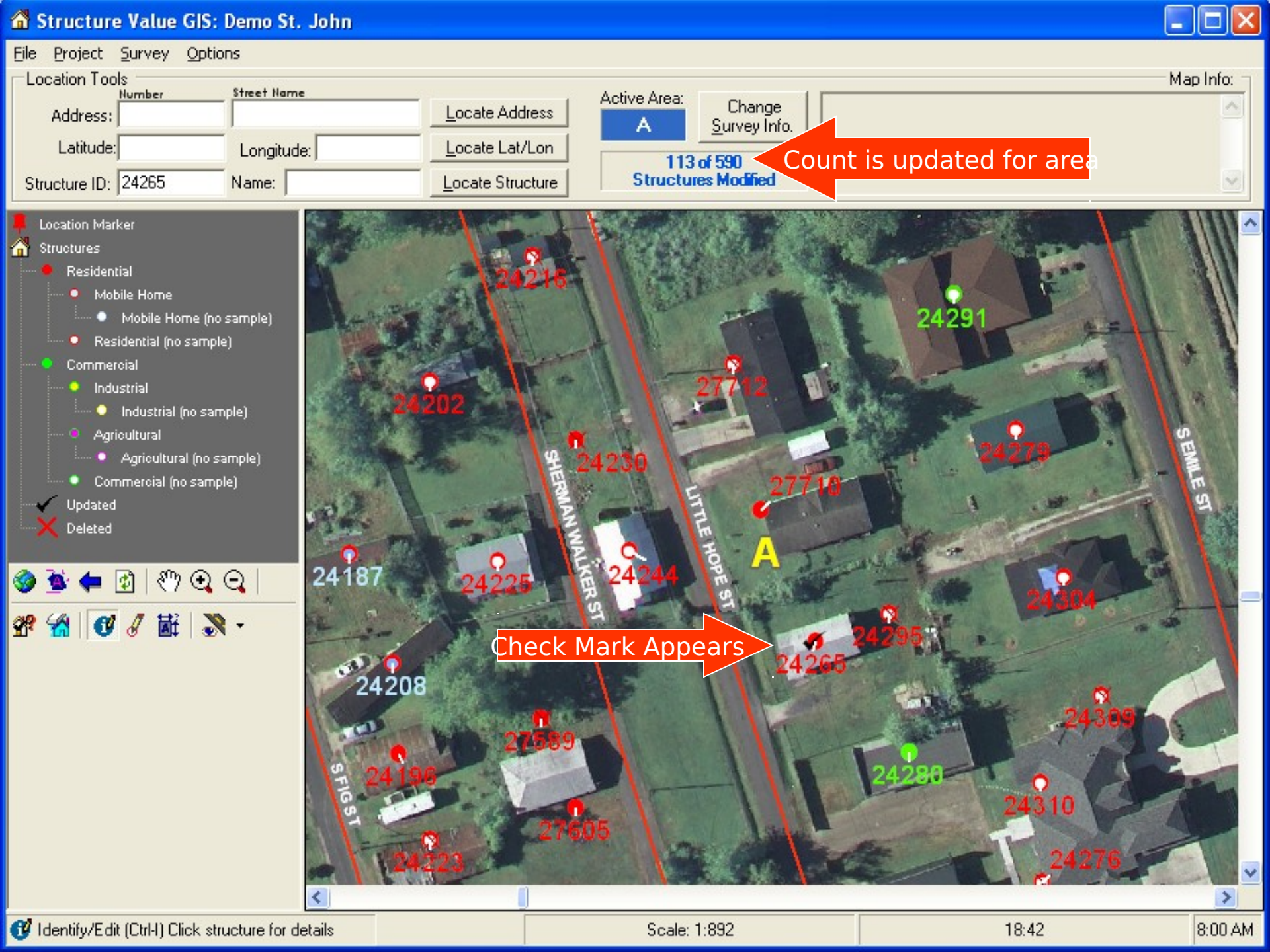
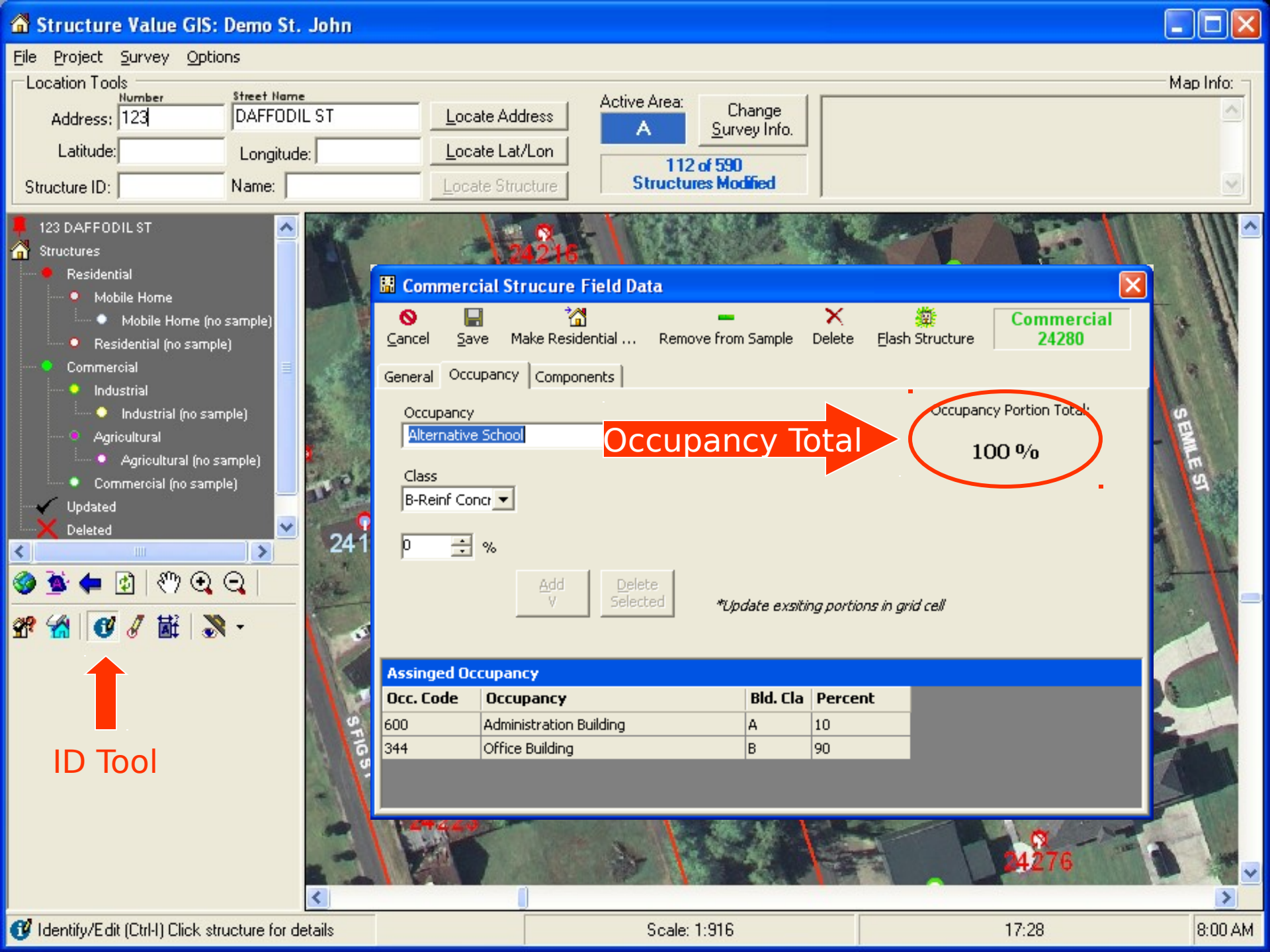

Structure Value GIS: Demo St. John
File
Project
Survey
Options
Location Tools
Number
Street Name
Address: 123
DAFFODIL ST
Locate Address
Latitude:
Longitude:
Locate Lat/Lon
Structure ID:
Name:
Locate Structure
Active Area:
A
Change Survey Info.
112 of 590 Structures Modified
Map Info:
123 DAFFODIL ST
Structures
Residential
Mobile Home
Mobile Home (no sample)
Residential (no sample)
Commercial
Industrial
Industrial (no sample)
Agricultural
Agricultural (no sample)
Commercial (no sample)
Updated
Deleted
Save
24216
24291
Residential Structure Field Data
Cancel
Save
Make Commercial ...
Remove from Sample
Delete
Flash Structure
Residential
24265
General
Components
System:
Exterior Walls
Roofing
Garage/Carport
Heating/Cooling
Component:
202 - Built-Up Rock
203 - Clay Tile
204 - Clay Tile or Concrete Tile
207 - Composition Roll
209 - Concrete Tile
210 - Copper
211 - Galvanized Metal
213 - Metal, Formed Seams
Component Portion Totals:
Exterior Walls 100 %
Roofing 100 %
Heating/Cooling 100 %
100 %
Add V
Delete Selected
*Update exsiting portions in grid cell
Assinged Components
System
Component
Portion
Exterior Walls
107 - Siding, Vinyl
100 %
Heating/Cooling
351 - Warmed and Cooled Air (heating
100 %
Roofing
208 - Composition Shingle
100 %
ID Tool
Identify/Edit (Ctrl-I) Click structure for details
Scale: 1:916
17:28
8:00 AM


Structure Value GIS: Demo St. John
File
Project
Survey
Options
Location Tools
Number
Street Name
Address:
Locate Address
Latitude:
Longitude:
Locate Lat/Lon
Structure ID: 24265
Name:
Locate Structure
Active Area:
A
Change Survey Info.
113 of 590 Structures Modified
Count is updated for area
Map Info:
Location Marker
Structures
Residential
Mobile Home
Mobile Home (no sample)
Residential (no sample)
Commercial
Industrial
Industrial (no sample)
Agricultural
Agricultural (no sample)
Commercial (no sample)
Updated
Deleted
24216
24291
27712
24202
24230
24279
27710
SHERMAN WALKER ST
LITTLE HOPE ST
SEMLE ST
A
24187
24225
24244
24304
Check Mark Appears
24295
24265
24208
24309
27589
24280
24196
24310
S FIG ST
27605
24223
24276
Identify/Edit (Ctrl-I) Click structure for details
Scale: 1:892
18:42
8:00 AM


Structure Value GIS: Demo St. John
File Project Survey Options
Location Tools
Number
Street Name
Address: 123 DAFFODIL ST
Locate Address
Latitude:
Longitude:
Locate Lat/Lon
Structure ID:
Name:
Locate Structure
Active Area:
A
Change Survey Info.
112 of 590 Structures Modified
Map Info:
123 DAFFODIL ST
Structures
Residential
Mobile Home
Mobile Home (no sample)
Residential (no sample)
Commercial
Industrial
Industrial (no sample)
Agricultural
Agricultural (no sample)
Commercial (no sample)
Updated
Deleted
ID Tool
Commercial Strucure Field Data
Cancel
Save
Make Residential ...
Remove from Sample
Delete
Flash Structure
Commercial 24280
General
Occupancy
Components
Occupancy
Alternative School
Occupancy Total
Occupancy Portion Total:
100 %
Class
B-Reinf Concr
0
%
Add
Delete Selected
*Update exsiting portions in grid cell
Assinged Occupancy
Occ. Code
Occupancy
Bld. Cla
Percent
600
Administration Building
A
10
344
Office Building
B
90
SEMLE ST
S FIG ST
Identify/Edit (Ctrl-I) Click structure for details
Scale: 1:916
17:28
8:00 AM

Structure Valuation

- After Damage Categories & Zip Codes are assigned, data is ready for valuation
- System or GIS administrator may want to manually merge data from several “field” databases into one ‘master” database before but data can be processed separately.
- If valuation process is handled by MS/B Estimators, data can be easily exported by GeoFIT and imported by estimators

Exporting Field Data to M&S Estimators

- Residential & Commercial are separate exports
- Different formats
- Structures Exported:
  - Sampled
  - Modified
  - Not deleted

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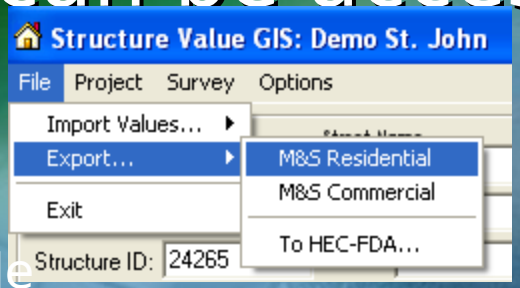
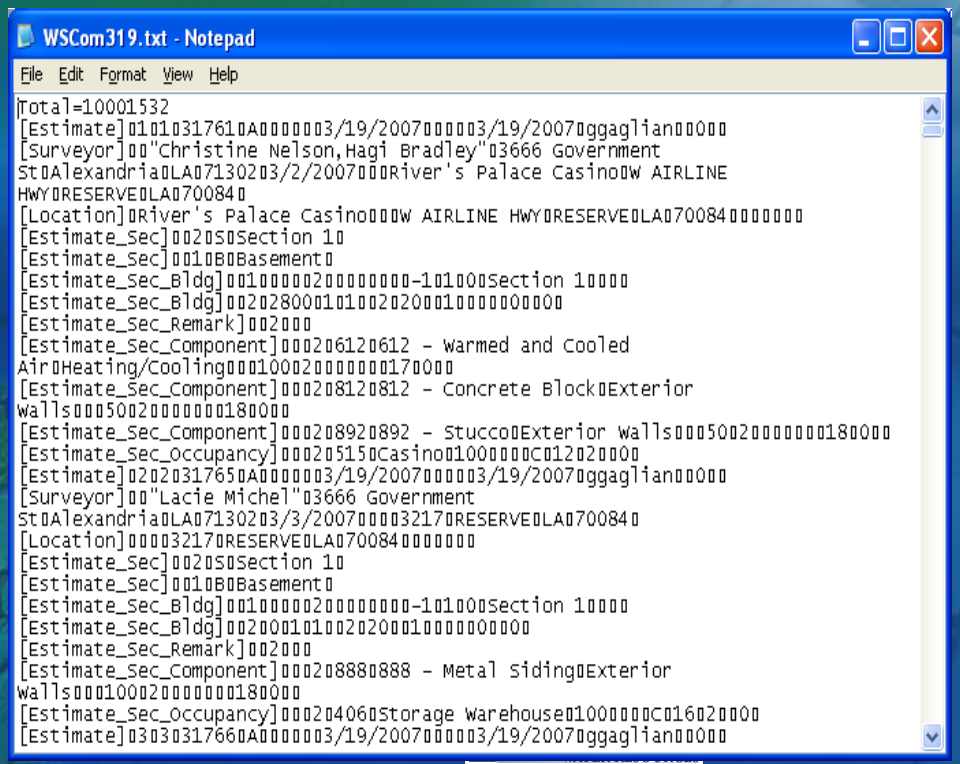
Exporting Data for M&S

- Export functions can be accessed from main menu File/Export..



Residential Estimator Data File



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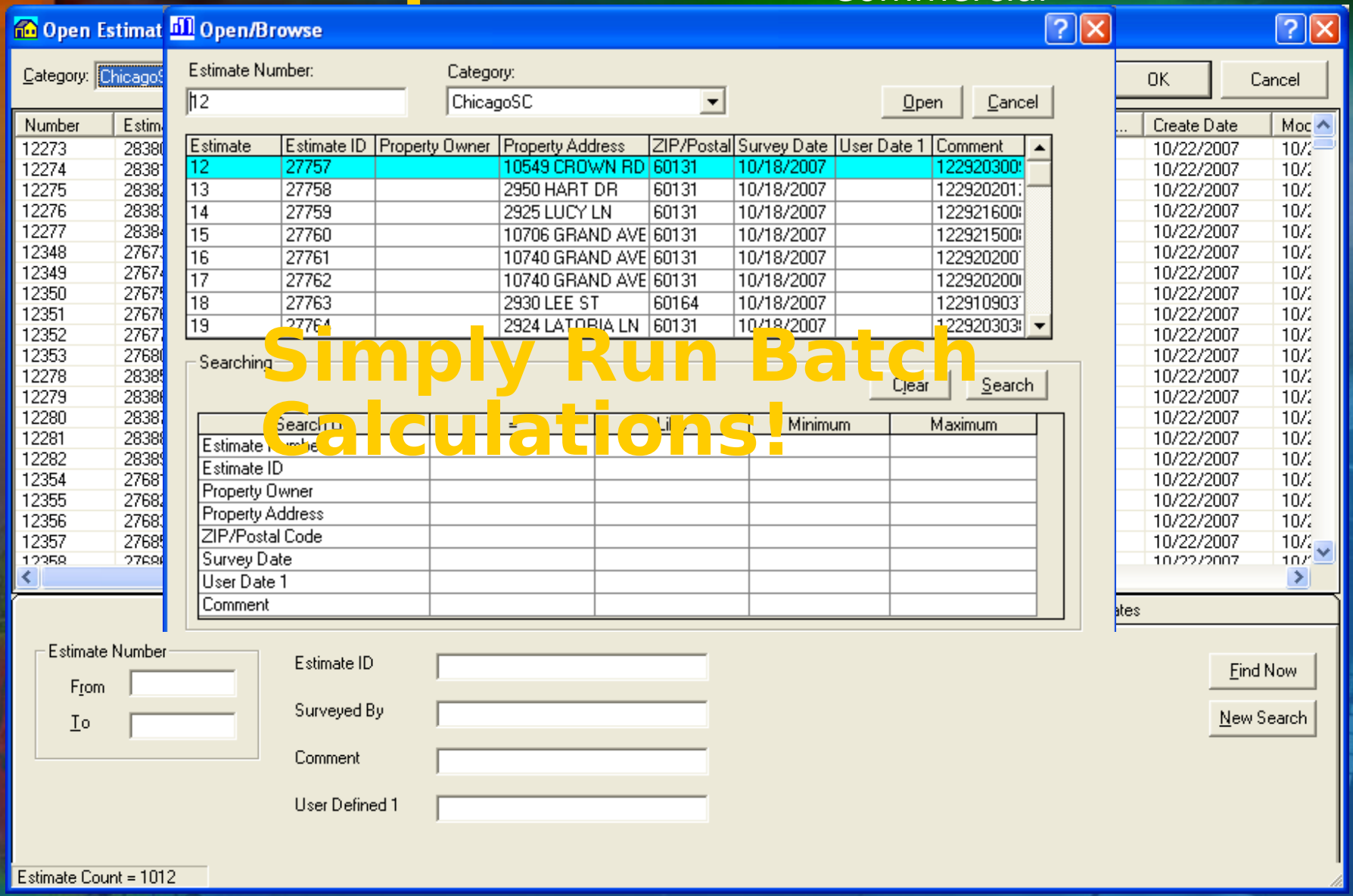
After Import

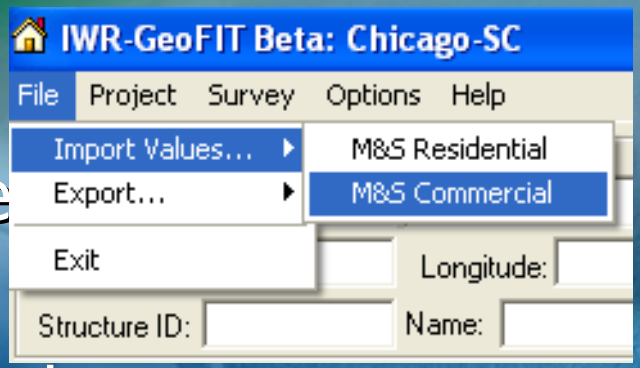
Residential Commercial

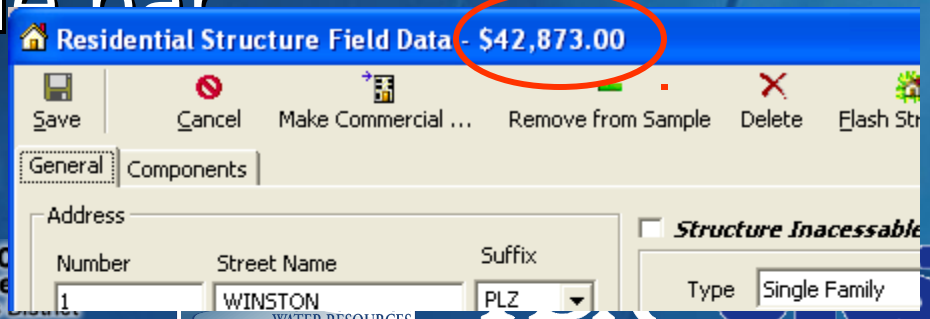


Simply Run Batch Calculations!

Import Values Back to Project Geodatabase

- GeoFIT main menu
  1. File
  2. Import Commercial/Re
  3. Select File(s)
  4. Import Status Info Window
  5. Complete Message
- Values will appear on edit form title bar





HEC-FDA Export

- When valuation is completed, the last step in the structure inventory process is to include the data into the HEC-FDA model for evaluation
- Before data can be exported..
  - First floor structure elevations must be assigned
  - Structures must be assigned hydrologic station numbers
  - MS/B occupancy codes for commercial structures must be linked to HEC-FDA occupancy codes setup by HEC-FDA modeler

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HEC-FDA Export

- Once data is assigned, structure data is simply exported to HEC-FDA format from the main menu bar under File/Export/ to HEC-FDA..
- **Workflow Complete**

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GeoFIT Assistance

HDR is under Contract with IWR to provide “helpdesk” support to Districts/Contractors and maintain software.

Experiences from the Field

Judith Walker

US Army Corps of Engineers ®
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Experience from Prior Projects

- Westshore Structure Inventory
  - New Orleans District
  - 18,100 inventories conducted
  - Field beta-test for GeoFit Program
- Amite River/Bayou Manchac Structure Inventory
  - New Orleans District
  - 6,700 inventories conducted
- Raymondville Structure Inventory
  - Galveston District
  - 1,000 inventories conducted (update of existing)

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Pre-Fieldwork Preparations

- Training
  - Structure Inventory basics (effective age ≠ actual age)
  - Marshall and Swift Occupancy Codes
  - Using GeoFit software program
- Identify buildings/areas of potential problems
  - Correctional Facilities
  - Gated Communities (especially if no guard)

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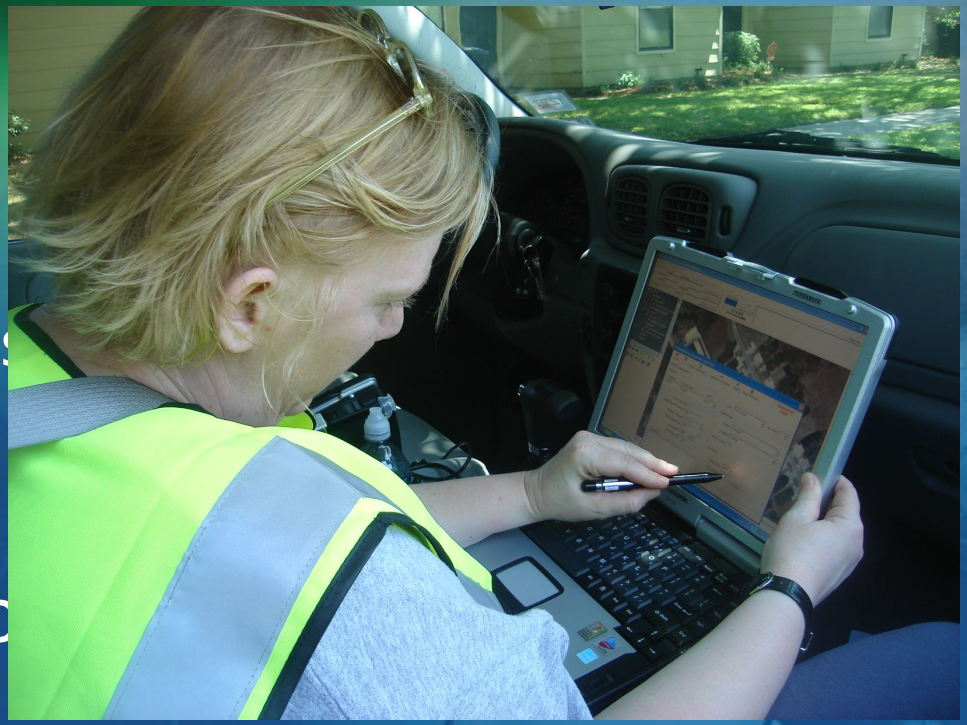
Field Collection

- Equipment
  - Computers
  - Reference guides
  - Cameras
- Team composition
- Driving versus walking



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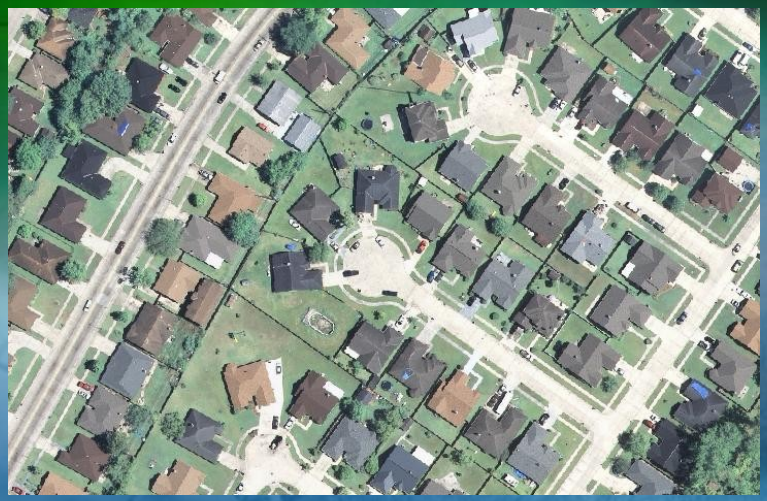
Lessons Learned from Field

- Completed inventories per day per team varies
  - Residential versus Commercial
  - Urban versus Suburban versus Rural
- Weather
  - Need to be able to see structure & get first floor correction
  - Sun glare can dramatically impact photo quality

Lessons Learned from Field (cont.)

- Pre-loaded information, more = better
  - Addresses
  - Building footprints
- Reduce component lists when possible
- Aerial photo resolution can make a big difference
- Snap road file to imagery for proper alignment



Take Away Points

- Think outside the box. Is there a better way?
- How to improve efficiency of data collection, storage, and transferability into M&S or HEC-FDA
- GeoFIT can be custom “FIT” to your needs
- Help is available
- Working Relationship between GIS/IT & Planners/ Economists
- Districts NEED GIS support!

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